**Application: Formative Science Assessments – Elementary Science**

**Process, Assessment, Outcome (PAO) Workshop Application**

The Montana Office of Public Instruction's (OPI) Assessment Division, is bringing together a group of science educators to review high-quality aligned assessment items and identify cohesive item sets and instructional strategies to meet the Montana Science Standards. Montana adopted new science standards in September of 2016 and they align with the Next Generation Science Standards (NGSS). As teachers make the transition to instruction aligned to NGSS, formative assessment will be an essential tool to ensure that instruction meets student need.

Through using assessments in this formative way teachers will have instruction that is guided by, and responsive to, information they have about their students. The product(s) of this workshop will be to provide elementary and secondary educators with access to high-quality items, item sets, and instructional strategies teachers can use to dig deeper into the standards.

**Deadline extended: This form closes on Monday, April 24th at 9:00 am.**

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| 1. Name (First and Last Name): |
| 2. Preferred Email: |
| 3. Phone: |
| 4. Present or most recent employer:<br>For example: school name, organization, etc. |
| 5. School City:<br>If you are not currently teaching, indicate the city you live in. |
| 6. Present or most recent teaching assignment:<br>For example: I taught high school biology in a rural class A school. |
| 7. Please tell us your highest degree attained, any endorsements you have, and the core concentration of your education. |

8. Do you have any specialized training or expertise? (e.g., IEFA, LEP, ESL, SWD, etc.)

9. Please indicate the subjects you have taught and how many years of experience you have in each.

| | Years 0 - 1 | Years 1.1 - 5 | Years 5.1 - 10 | Years 10.1-15 | Years 15 + | Pre-service training only. | None. |
|---|---|---|---|---|---|---|---|
| Elementary science | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Astronomy | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Biology | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Chemistry | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Computer science | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| General Biology | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Earth Science | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Engineering | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Geology | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Physics | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Other Biological Science | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Other Physical Science | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Other Earth Science | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

10. Please indicate the grades you have taught and how many years of experience you have in each.

| | Years 0 - 1 | Years 1.1 - 5 | Years 5.1 - 10 | Years 10.1-15 | Years 15 + | Pre-service training only. | None. |
|---|---|---|---|---|---|---|---|
| Early childhood | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Kindergarten | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Grade 1 | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Grade 2 | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Grade 3 | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Grade 4 | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Grade 5 | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Grades 6 - 8 | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Grades 9-10 | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Grades 11- 12 | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Undergraduate level | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Graduate level | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

11. What activities, professional development, and/or trainings have you participated in that involve the Next Generation Science Standards (NGSS), the Framework for K – 12 Science Education, and/or Montana Science Standards (2016)?

12. Select your degree of comfort with using and/or navigating Next Generation Science Standards (NGSS), the Framework for K – 12 Science Education, and/or Montana Science Standards (2016):

| ☐ | ☐ | ☐ | ☐ | ☐ |
|---|---|---|---|---|
| 1- Novice – very comfortable. | 2 | 3 | 4 | 5-Highly familiar – very comfortable. |

13. Please rate yourself in the following areas by checking the appropriate level for each skill:

| | 3 = Strong Skills. Extensive experience in this area. | 2 = Moderate Skills. Some experience in this area. | 1 = Novice. Limited experience in this area. |
|---|---|---|---|
| Collaboration: Working with Others | ○ | ○ | ○ |
| Critical thinking and Problem-Solving | ○ | ○ | ○ |
| Adaptability | ○ | ○ | ○ |
| Accessing and Analyzing Information | ○ | ○ | ○ |
| Initiative and Perseverance | ○ | ○ | ○ |
| Facilitation Skills | ○ | ○ | ○ |
| Communication Skills (Verbal and Written) | ○ | ○ | ○ |

14. For this workshop, what area are you interested in evaluating?

- ☐ Elementary Science (K-2)
- ☐ Elementary Science (3-5)
- ☐ MS-Life Science
- ☐ MS-Earth and Space Science
- ☐ MS-Physical Science
- ☐ HS-Life Science
- ☐ HS-Earth and Space Science
- ☐ HS-Physical Science

15. If selected for this workshop, select your future interests in Montana Science Standard work:

- ☐ I'm interested in being a teacher leader (e.g., school, district, and statewide).
- ☐ I'm interested in developing online content for the Teacher Learning Hub.
- ☐ I'm interested in developing items for Montana's statewide summative science assessment.
- ☐ I'm interested in reviewing items for Montana's statewide summative science assessment.
- ☐ I'm interested in submitting my own assessments (formative and interim) for statewide use.
- ☐ I'm interested in being involved in anything related to science at the state.
- ☐ I'm not interested in any other activities at this time.

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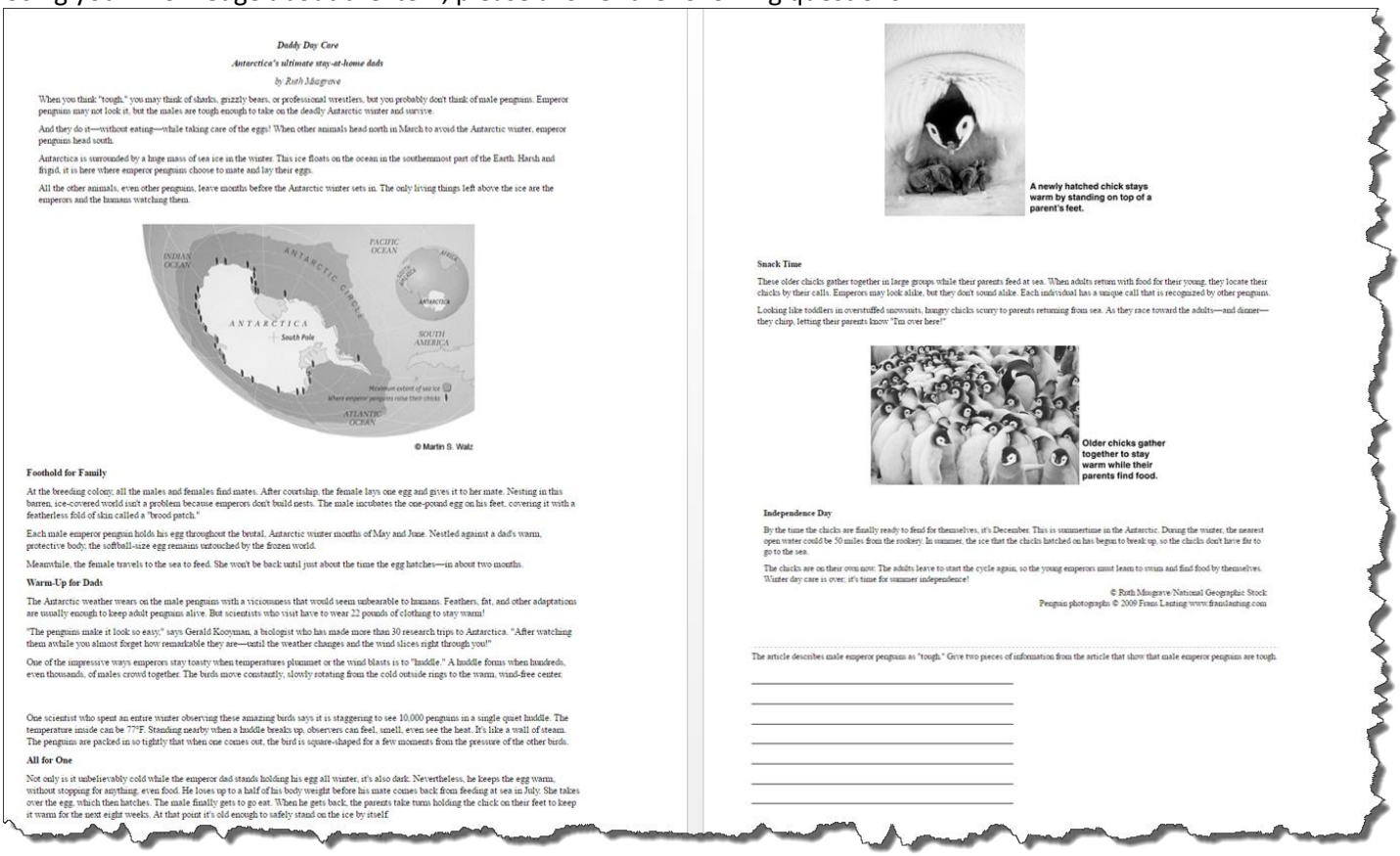
| 16. If selected, please describe how your participation in this work will continue to serve your career interests and professional growth. |
| 17. If selected, what are some ways (after the workshop) you plan to use this experience in your practice and/or share this experience with others. |

**Deconstruct - Align - Apply**

For Questions 1 – 15, please use A Framework for K – 12 Science Education or http://nextgenscience.org. You may download a free PDF of the A Framework for K – 12 Science Education at https://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts.

The below item may be outside your expertise but use the supports provided to deconstruct the item. Selected participants will be matched with their content area and expertise. For more information about the item, please visit: http://nces.ed.gov/nationsreportcard/itmrlsx/portal.aspx?type=display&questionlist=2011-4R4:3&index=1&tab=ques
Using your knowledge about the item, please answer the following questions.



*Daddy Day Care*

*Antarctica's ultimate stay-at-home dads*

*by Ruth Musgrave*

When you think "tough," you may think of sharks, grizzly bears, or professional wrestlers, but you probably don't think of male penguins. Emperor penguins may not look it, but the males are tough enough to take on the deadly Antarctic winter and survive.

And they do it—without eating—while taking care of the eggs! When other animals head north in March to avoid the Antarctic winter, emperor penguins head south.

Antarctica is surrounded by a huge mass of sea ice in the winter. This ice floats on the ocean in the southernmost part of the Earth. Harsh and frigid, it is here where emperor penguins choose to mate and lay their eggs.

All the other animals, even other penguins, leave months before the Antarctic winter sets in. The only living things left above the ice are the emperors and the humans watching them.



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**Foothold for Family**

At the breeding colony, all the males and females find mates. After courtship, the female lays one egg and gives it to her mate. Nesting in this barren, ice-covered world isn't a problem because emperors don't build nests. The male incubates the one-pound egg on his feet, covering it with a featherless fold of skin called a "brood patch."

Each male emperor penguin holds his egg throughout the brutal, Antarctic winter months of May and June. Nestled against a dad's warm, protective body, the softball-size egg remains untouched by the frozen world.

Meanwhile, the female travels to the sea to feed. She won't be back until just about the time the egg hatches—in about two months.

**Warm-Up for Dads**

The Antarctic weather wears on the male penguins with a viciousness that would seem unbearable to humans. Feathers, fat, and other adaptations are usually enough to keep adult penguins alive. But scientists who visit have to wear 22 pounds of clothing to stay warm!

"The penguins make it look so easy," says Gerald Kooyman, a biologist who has made more than 30 research trips to Antarctica. "After watching them awhile you almost forget how remarkable they are—until the weather changes and the wind slices right through you!"

One of the impressive ways emperors stay toasty when temperatures plummet or the wind blasts is to "huddle." A huddle forms when hundreds, even thousands, of males crowd together. The birds move constantly, slowly rotating from the cold outside rings to the warm, wind-free center.

One scientist who spent an entire winter observing these amazing birds says it is staggering to see 10,000 penguins in a single quiet huddle. The temperature inside can be 77°F. Standing nearby when a huddle breaks up, observers can feel, smell, even see the heat. It's like a wall of steam. The penguins are packed in so tightly that when one comes out, the bird is square-shaped for a few moments from the pressure of the other birds.

**All for One**

Not only is it unbelievably cold while the emperor dad stands holding his egg all winter, it's also dark. Nevertheless, he keeps the egg warm, without stopping for anything, even food. He loses up to a half of his body weight before his mate comes back from feeding at sea in July. She takes over the egg, which then hatches. The male finally gets to go eat. When he gets back, the parents take turns holding the chick on their feet to keep it warm for the next eight weeks. At that point it's old enough to safely stand on the ice by itself.



**A newly hatched chick stays warm by standing on top of a parent's feet.**

**Snack Time**

These older chicks gather together in large groups while their parents feed at sea. When adults return with food for their young, they locate their chicks by their calls. Emperors may look alike, but they don't sound alike. Each individual has a unique call that is recognized by other penguins.

Looking like toddlers in overstuffed snowsuits, hungry chicks scurry to parents returning from sea. As they race toward the adults—and dinner—they chirp, letting their parents know "I'm over here!"



**Older chicks gather together to stay warm while their parents find food.**

**Independence Day**

By the time the chicks are finally ready to fend for themselves, it's December. This is summertime in the Antarctic. During the winter, the nearest open water could be 50 miles from the rookery. In summer, the ice that the chicks hatched on has begun to break up, so the chicks don't have far to go to the sea.

The chicks are on their own now. The adults leave to start the cycle again, so the young emperors must learn to swim and find food by themselves. Winter day care is over; it's time for summer independence!



The article describes male emperor penguins as "tough." Give two pieces of information from the article that show that male emperor penguins are tough.

1. What grade-band is most applicable to this item? Please select the best option.

- ☐ Grades K-2
- ☐ Grades 3-5
- ☐ Grades MS (i.e., 6-8)
- ☐ Grades HS (i.e., 9-12)

2. Identify the Disciplinary Core Ideas students must understand. Select all relevant concepts. (Description of Disciplinary Core Ideas on Framework pages 103 – 214). NGSS at: http://nextgenscience.org/sites/default/files/resource/files/Appendix%20E%20-%20Progressions%20within%20NGSS%20-%20052213.pdf

- ☐ PS1: Matter and its interactions
- ☐ PS2: Motion and stability: Forces and interactions
- ☐ PS3: Energy
- ☐ PS4: Waves and their applications in technologies for information transfer
- ☐ LS1: From molecules to organisms: Structures and processes
- ☐ LS2: Ecosystems: Interactions, energy, and dynamics
- ☐ LS3: Heredity: Inheritance and variation of traits
- ☐ LS4: Biological evolution: Unity and diversity
- ☐ ESS1: Earth's place in the universe
- ☐ ESS2: Earth's systems
- ☐ ESS3: Earth and human activity
- ☐ ETS1: Engineering design
- ☐ ETS2: Links among engineering, technology, science, and society

3. Identify the Crosscutting Concepts students must understand. Select all relevant concepts. (Description of Crosscutting Concepts on Framework page 84). NGSS at: http://nextgenscience.org/sites/default/files/resource/files/Appendix%20G%20-%20Crosscutting%20Concepts%20FINAL%20edited%204.10.13.pdf

- ☐ Patterns
- ☐ Cause and effect: Mechanism and explanation
- ☐ Scale, proportion, and quantity
- ☐ Systems and system models
- ☐ Energy and matter: Flows, cycles, and conservation
- ☐ Structure and function
- ☐ Stability and change

4. Identify the Science and Engineering Practices students must use. Select all relevant practices. (Description of Practices on Framework pages 50 – 53). NGSS at: http://nextgenscience.org/sites/default/files/resource/files/Appendix%20F%20%20Science%20and%20Engineering%20Practices%20in%20the%20NGSS%20-%20FINAL%20060513.pdf

- ☐ Asking questions (for science) and defining problems (for engineering)
- ☐ Developing and using models
- ☐ Planning and carrying out investigations
- ☐ Analyzing and interpreting data
- ☐ Using mathematics and computational thinking
- ☐ Constructing explanations (for science) and designing solutions (for engineering)
- ☐ Engaging in argument from evidence
- ☐ Obtaining, evaluating, and communicating information

5. Identify the corresponding Montana Performance Standard for this item.
(e.g., NGSS Performance Expectation, K-2-ETS1).

6. What is the focus or skills being emphasized by this item? Identify an NGSS Evidence Statement from http://nextgenscience.org/evidence-statements that provides observable features of student knowledge and skill(s). Provide one claim statement for this item below:

7. Select the degree of alignment to the Montana Performance Standard. How well does this item "fit" the Montana Performance Standard? Please select the best option.

- ☐ **Full alignment.** This question clearly belongs in this standard.
- ☐ **Strong partial alignment.** This item may belong in this standard; however, there is one or more aspects of the item that does not fit well.
- ☐ **Weak partial alignment.** There is some overlap with the standard but it is a stretch and we cannot find a better standard.
- ☐ **No alignment.**

8. Must your 3-Dimensional selection match exactly the Montana Performance Standard/NGSS performance expectation in order to be aligned? Explain your thinking about item alignment.

9. Cognitive Rigor. What is the Depth of Knowledge (DOK) for this item? Please select the best option. Resource at: https://drive.google.com/file/d/0B34l3UA3OHHnLU80UWhNLW83YWM/view?usp=sharing

- ☐ Level 1-Recall
- ☐ Level 2- Skills & Concepts/ Basic Reasoning
- ☐ Level 3- Strategic Thinking/ Complex Reasoning
- ☐ Level 4- Extended Thinking

10. Cognitive Rigor. What is the Bloom's Taxonomy for this item? Please select the best option. Resource at: https://drive.google.com/file/d/0B34l3UA3OHHnLU80UWhNLW83YWM/view?usp=sharing

- ☐ Remember (Level 1)
- ☐ Understand (Level 2)
- ☐ Apply (Level 3)
- ☐ Analyze (Level 4)
- ☐ Evaluate (Level 5)
- ☐ Create (Level 6)

11. Explain if there is any connection to Montana's Math Standards and/or the math practices. If a connection exists, identify what content and/or skills are being reinforced. Math practice resource located at: http://nstahosted.org/pdfs/ngss/PracticesVennDiagram.pdf
(e.g., the mathematical practice "reason abstractly and quantitatively", etc.).

12. Explain if there is any connection to Montana's English Language Arts Standards and/or the ELA student capacities. If a connection exists, identify what content and/or skills are being reinforced. Student capacities resource located at: http://nstahosted.org/pdfs/ngss/PracticesVennDiagram.pdf
(e.g., "engage in argument from evidence", etc.)

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| 13. Describe a formative assessment and/or strategy that can be used with students to ensure their understanding of this standard (e.g., pre/post-tests, exit slips, student-generated test questions, one minute summary, etc.) |
| 14. Describe how this item may be developed to include or how it already includes an authentic learning experience for students (e.g., cultural significance, place-based, etc.) |
| 15. How could this item or topic be modified to meet the needs of multiple learning styles and/or abilities? (e.g., heterogeneous grouping, think-pair-share, KWL charts, etc.) |

## Thank you for your interest in this summer workshop!

**Application screening begins April 10th & selections will be made by April 21st.**
**We will inform all applicants of our participant decisions after April 21st.**